Working Paper

Department of Finance

Economic and Fiscal Policy Branch

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101-07377/

Analysing Vertical Fiscal Imbalance in a Framework of Fiscal Sustainability

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Department of Finance Working Paper 2001-23

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* This paper reflects the views of the authors and no responsibility for them should be attributed to the Department of Finance. The authors would like to thank François Delorme for his comments and suggestions. The authors would also like to thank Brian Murphy for his assistance with SPSD/M. Any and all errors are the responsibility of the authors.

Abstract

Recent studies on vertical fiscal imbalance (VFI) in Canada subscribe to a definition of VFI that is based on the mismatch in structural budget balances between the federal and provincial/territorial levels of government. In this framework, projected budget balances illustrate the path of VFI. Using a measure of fiscal sustainability developed in Auerbach (1997), this paper constructs an indicator of VFI that is based on the amount of fiscal room available, subject to a government's intertemporal budget constraint, given underlying fiscal projections. VFI exists in this framework if one level of government has fiscal room available to reduce taxes or increase program spending -- and satisfy its intertemporal constraint -- while the other level of government must increase taxes or reduce spending in order to satisfy its intertemporal budget constraint. Fiscal projections underlying the VFI indicator are based on a framework used in the generational accounting literature and in King and Jackson (2000). Based on the definition of VFI and fiscal projections presented in this paper, there does not appear to be a vertical fiscal imbalance between the federal and provincial/territorial governments in Canada.

Résumé

Des études sur le déséquilibre budgétaire vertical (DBV) réalisées récemment au Canada souscrivent à une définition de ce déséquilibre qui se fonde sur l'inégalité des soldes budgétaires structuraux du gouvernement fédéral et des gouvernements provinciaux et territoriaux. Dans ce cadre, les soldes budgétaires projetés des gouvernements fédéral et provinciaux et territoriaux illustrent le cheminement du DBV. Grâce à une mesure de la viabilité financière developpée par Auerbach (1997), ce document présente un indicateur du DBV qui se fonde sur la marge de manœuvre budgétaire disponible, prenant en compte la contrainte budgétaire intertemporelle d'un gouvernement, etant donné un ensemble de projections budgétaires sous-jacentes. Dans ce cadre, il y a DBV lorsqu'un ordre de gouvernement dispose d'une marge de manœuvre budgétaire pour réduire ses impôts ou accroître ses dépenses de programmes, et satisfaire sa contrainte intertemporelle, tandis que l'autre ordre de gouvernement doit accroître ses impôts ou réduire ses dépenses pour satisfaire sa contrainte budgétaire intertemporelle. Les projections budgétaires à la base de l'indicateur du DBV se fondent sur un cadre utilisé dans les études comptables intergénérationnelles de même que King et Jackson (2000). Selon la définition du DBV et les projections budgétaires présentées dans ce document, il ne semble pas y avoir de déséquilibre budgétaire vertical entre le gouvernement fédéral et les gouvernements provinciaux et territoriaux au Canada.

Introduction

With the recent improvement in budget balances across levels of government in Canada, concern has been raised that the current fiscal structure will generate a large and growing vertical fiscal imbalance (VFI). This VFI scenario is often characterised as one where the federal government experiences an "embarrassment of riches" in terms of large and increasing budget surpluses while provincial/territorial governments struggle over the next several years to avoid budget deficits. In such a case, VFI could have important implications for fiscal federalism in Canada given that its existence is said to "strain federal-provincial relations and undermine the stability of a federation" (Ruggeri et al. (1993b: p.194)).

Ruggeri and Howard (2000) note however that there is no unique concept of VFI in the literature on fiscal federalism. Recent studies on vertical fiscal imbalance in Canada subscribe to a definition of VFI that is based on the mismatch in structural budget balances between federal and provincial/territorial levels of government. Given this definition, these studies find a large and growing VFI, which they illustrate by projecting the respective budget balances over the long term.

This paper consists of two parts. The first part develops an indicator of VFI that is directly linked with the notion of fiscal sustainability. The second part of the paper presents a projection framework which generates long-term fiscal projections that form the basis of the VFI indicator.

Our paper first briefly highlights recent studies on VFI in Canada and finds that these studies do not directly link VFI with the notion of fiscal sustainability based on the government's intertemporal budget constraint. Fiscal sustainability is defined in this paper in terms of satisfying a government's intertemporal budget constraint, which simply put, implies that fiscal policy does not lead to explosive debt accumulation. Intergovernmental transfers constitute a significant component of provincial/territorial revenue and federal expenditure and therefore influence the degree of fiscal sustainability for both levels of government.

Using a measure of fiscal sustainability developed in Auerbach (1997), an indicator of VFI is constructed that is based on the amount fiscal room available to each level of government. This amount is determined by the degree to which federal and provincial/ territorial governments satisfy their intertemporal budget constraints. In this framework, VFI is said to exist if one level of government has fiscal room available to reduce taxes or increase program spending -- and satisfy its intertemporal budget constraint -- while the other level of government must increase taxes or reduce spending in order to achieve fiscal sustainability. This approach, in some sense, extends the conventional "mismatching" definition of VFI into a dynamic framework that explicitly incorporates the link between budget balances and fiscal sustainability. It also allows for direct measurement of the degree of VFI and of the adjustment required to eliminate VFI.

In order to calculate estimates of fiscal room based on the Auerbach (1997) framework, long-term projections of revenue and program spending categories are required. Thus, this paper also presents a projection framework for constructing long-term fiscal projections. These projections form the basis of our VFI indicator. Using a fiscal projection approach employed in generational accounting (GA) studies and in King and Jackson (2000), estimates of federal and provincial/territorial fiscal room are calculated under various assumptions and scenarios. Based on these estimates and given this paper's definition of VFI, there does not appear to be a vertical fiscal imbalance between the federal and provincial/territorial governments in Canada.

This paper is divided into three main sections. Section 1 reviews the concept of VFI used in recent studies as well as Auerbach's (1997) measure of fiscal sustainability. This section also discusses the VFI indicator based on Auerbach's measure. Section 2 briefly discusses the fiscal projection framework used in recent VFI studies and then presents the framework that is used to generate long-term fiscal projections which form the basis of our VFI indicator. Fiscal, economic and demographic data and assumptions are also presented. Section 3 first provides long-term (benchmark) fiscal projections and then presents the VFI indicator under a variety of alternative assumptions and scenarios.

1 The Concept of Vertical Fiscal Imbalance

1.1 Conventional Definition

Ruggeri et al. (1993b) note that VFI is conventionally defined as a mismatch between actual revenues and expenditures at different levels of government during a specific period of time. They summarise the literature in this area and identify a considerable range of concepts and approaches to evaluating VFI.[1] For example, their survey identifies static concepts of VFI (e.g., ratios of federally-controlled to state-controlled revenue) as well as welfare-theoretic concepts that are linked to public choice models and other approaches that compare the marginal cost of funds across governments.

Ruggeri (2000) and Ruggeri and Howard (2000) subscribe to the conventional "mismatching" definition of VFI. They note that this definition is particularly useful because it places VFI within the familiar dimensions of government budgets and allows a direct approach to measurement. Ruggeri and Howard then extend this concept of mismatching to a dynamic framework rather than the more familiar static one. In their framework, the mismatch in terms of the built-in growth of revenues and expenditures, for a given level of government and fiscal structure, is referred to as the structural fiscal balance. The difference in structural fiscal balances between levels of government forms the "roots" of VFI and the difference in the magnitude of budget balances over time is defined as the path of VFI.

For the period 1999/00 to 2019/20, Ruggeri and Howard (2000) compute the roots of VFI and the path of VFI. In terms of the roots of VFI, they find that federal revenues are projected to grow at approximately twice the rate of federal expenditures while provincial/territorial revenues are projected to grow only slightly faster than expenditures. These roots result in a path of VFI that increases substantially over time as the federal government enjoys rapidly increasing surpluses while the provincial/territorial fiscal position improves slowly.

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[1] In their survey, Ruggeri et al. (1993b) cite Wagner (1973), Hunter (1977), and Hettich and Winer (1986). Ruggeri and Howard (2000) also survey the literature on VFI and cite Dahlby and Wilson (1994).

Ruggeri and Howard's (2000) concept of VFI can be traced back to earlier work that examined structural fiscal imbalances in Canada. In Ruggeri et al. (1993a), structural imbalance is similarly defined however it is linked more directly to the notion of fiscal sustainability. For example, under various assumptions, Ruggeri et al. (1993a) note that structural balance implies a constant, or a declining, debt-to-GDP ratio with a limit of zero. VFI is then illustrated in Ruggeri et al. (1993a, 1993b) by simulating future values of the budget balance and debt-to-GDP ratio for each level of government, given the underlying roots of VFI and starting points for the budget balance and debt. Their simulations show a rising provincial debt-to-GDP ratio and a falling federal debt-to-GDP ratio over the period 1992/93 to 2013/2014, thus indicating VFI.

The relationship between the stability of the debt-to-GDP ratio and structural imbalance that Ruggeri et al. (1993a) identify provides a useful starting point for conceptualising VFI in a dynamic framework that is linked directly to the notion of fiscal sustainability. Comparing the magnitude of (structural) budget balances across levels of government over time (i.e., the approach taken in Ruggeri (2000) and Ruggeri and Howard (2000)), provides one indicator of VFI. However, this approach is not entirely satisfactory because it focuses entirely on the relative size of the budget balances. At a given point in time, the magnitude of VFI is measured simply as the difference between budget balances across levels of government.

By constructing a measure of VFI that is based strictly on the relative size of the budget balances in a given year, there is a potential to fall into the trap of "fiscal illusion". Auerbach et al. (1991) and others demonstrate that it is theoretically possible for a government to conduct any type of fiscal policy it chooses and at the same time record a deficit or surplus of any size.[2] They note that "unfortunately, from the perspective of economic theory, the deficit is an arbitrary accounting construct" (Auerbach et al. (1991: p. 57)). Thus, constructing an indicator of VFI based on an arbitrary accounting construct does not seem entirely adequate in light of the fact that economic theory does offer a guide to circumventing this potential problem.

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[2] Auerbach et al. (1991) cite Kotlikoff (1984, 1988, 1989) and Auerbach and Kotlikoff (1987).

1.2 Fiscal Imbalance and Sustainability in the Auerbach (1997) Framework

As noted above, Ruggeri et al. (1993a) make the qualitative link between the stability of the debt-to-GDP ratio and structural imbalance. However, it is possible to proceed further and forge a more direct link. Auerbach (1997) provides a measure of fiscal imbalance (for a given level of government) that is derived using the government's intertemporal budget constraint and thus explicitly takes into account the notion of fiscal sustainability. Fiscal sustainability is defined in terms of satisfying the government's intertemporal budget constraint.

Auerbach's (1997) measure of fiscal imbalance/sustainability is based on the government's intertemporal budget constraint that requires the present value of future primary balances PB (defined as revenue minus program spending) to equal the base-year level of net debt D. In order to derive this constraint, it is necessary to solve the debt accumulation equation (1) forward and then impose the terminal or no-Ponzi-game condition (2).

(1) $$D_t = (1+r)\cdot D_{t-1} - PB_t$$

(2) $$\lim_{k\to\infty}(1+r)^{-k}\cdot D_{t+k} = 0$$

In order to satisfy terminal condition (2), government debt must not grow faster than the interest rate r. If this terminal condition is satisfied, the intertemporal budget constraint can be written as equation (3).

(3) $$D_t = PV\{PB\} = \sum_{i=1}^{\infty}(1+r)^{-i}\cdot PB_{t+i}$$

It is important to note however that this constraint "does not imply that the debt is ultimately repaid or even that it is ultimately constant" (Blanchard and Fischer 1989: p.126). If r exceeds the growth rate of the economy g and the debt grows at g (implying a constant debt-to-GDP ratio), then this constraint would be satisfied. However, in theory, this constraint could be satisfied in a number of ways.

Auerbach's approach to assessing fiscal imbalance is to determine residually -- for a given path of primary balances and initial level of debt -- the difference between D and $PV\{PB\}$. This residual can be thought of as the "fiscal gap" or "fiscal room" which is available beyond that implied by the initial projected paths of revenue and program spending.[3]

(4) $$D_t = PV\{PB\} + residual$$

Given the definition of the primary balance as revenue minus program spending, a negative residual indicates that fiscal room is available. Taxes could be lowered below or program spending raised above their initial projected levels in such a way that the intertemporal budget constraint would be satisfied with equality. A positive residual indicates that no fiscal room is available. In this case, taxes would have to be raised or program spending reduced in order to satisfy the intertemporal budget constraint.

Auerbach defines the residual fiscal gap more specifically as the permanent reduction in revenues or increase in program spending (as a constant share of GDP) required to satisfy equation (4). This amount is represented by Δ in equations (5) and (6) below. Given the definition of the primary balance, a negative value of Δ indicates that fiscal room is available above that projected in the initial path of the primary balance. A positive value of Δ indicates that fiscal room is not available and that adjustments in taxes or spending are required to satisfy the intertemporal budget constraint.

(5) $$D_t = \sum_{i=1}^{\infty} (1+r)^{-i} \cdot \left[PB_{t+i} + \Delta \cdot GDP_{t+i} \right]$$

(6) $$\Delta = \frac{D_t - PV\{PB\}}{PV\{GDP\}}$$

Auerbach's measure of fiscal imbalance provides an intuitive and convenient framework to summarise the degree of "mismatch" between projected revenue and spending for a

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[3] Auerbach and Gale (2000) refer to the size of the permanent increase in taxes or reductions in program spending (as a constant share of GDP) as the "fiscal gap".

given level of government. The degree of mismatch not only takes into account the dynamic nature of structural imbalance that Ruggeri et al. (1993a) identified, but also determines the amount of fiscal room that is available, consistent with fiscal sustainability. While Ruggeri et al. (1993a, 1993b) illustrate fiscal imbalance using debt-to-GDP projections, Auerbach's measure summarises and quantifies the degree of imbalance in a single number. Extending Auerbach's framework to assess VFI is relatively straightforward.

1.3 Assessing VFI in a Framework of Fiscal Sustainability

In this section we extend Auerbach's (1997) approach to measure fiscal imbalance for federal and provincial/territorial levels of government. Using long-term fiscal projections for the federal and consolidated provincial/territorial governments, we compute the corresponding measures of Δ. For the federal (denoted by the superscript *F*) and consolidated provincial/territorial (denoted by the superscript *PT*) levels of government, estimates of the fiscal gap are defined in equations (7) and (8).

$$\Delta^{F} = \left(D_t^{F} - PV\{PB^{F}\}\right) / PV\{GDP\} \tag{7}$$

$$\Delta^{PT} = \left(D_t^{PT} - PV\{PB^{PT}\}\right) / PV\{GDP\} \tag{8}$$

Estimates for the federal and provincial/territorial governments are defined by separate equations above. It is important to note however that they are in fact "connected" through federal intergovernmental transfers TR^{F}. Equations (9) and (10) below are rewritten in terms of the expanded definition of the primary balance in order to highlight the connection between Δ^{F} and Δ^{PT}. Federal revenue and provincial/territorial own-source revenue (both net of investment income) are represented by R^{F} and R^{PT} respectively. Federal and provincial/territorial program spending (net of inter-governmental transfers in the case of federal spending) are represented by PS'^{F} and PS^{PT} respectively.

(9) $$\Delta^{F} = \left(D_t^{F} - PV\{R^{F} - TR^{F} - PS'^{F}\}\right) / PV\{GDP\}$$

(10) $$\Delta^{PT} = \left(D_t^{PT} - PV\{R^{PT} + TR^{F} - PS^{PT}\}\right) / PV\{GDP\}$$

Table 1 below presents our VFI indicator based on the measures of Δ^{F} and Δ^{PT}. VFI is detected when the federal government has fiscal room available to reduce taxes or increase program spending (i.e., a negative fiscal gap $\Delta^{F} < 0$) while the provinces and territories are on a fiscally unsustainable path (i.e., a positive fiscal gap $\Delta^{PT} > 0$) and vice versa. Based on the terminology used in the literature, the former case of VFI is referred to as "positive" VFI (denoted as *+VFI*) and the latter case, where the provinces and territories have fiscal room but the federal government does not, is referred to as "negative" VFI (denoted as *-VFI*). If either level of government has a zero fiscal gap or has fiscal room available (i.e., $\Delta^{F} \leq 0$ and $\Delta^{PT} \leq 0$) beyond that implied by their initial projected primary balances, no VFI is detected.

Table 1 Fiscal Gaps and the VFI Indicator

	Fiscal Gap			
Federal Δ^{F}	$\Delta^{F} < 0$	$\Delta^{F} > 0$	$\Delta^{F} \leq 0$	$\Delta^{F} \geq 0$
Provincial/Territorial Δ^{PT}	$\Delta^{PT} > 0$	$\Delta^{P} < 0$	$\Delta^{PT} \leq 0$	$\Delta^{PT} \geq 0$
VFI Indicator	*+VFI*	*-VFI*	*No VFI*	*No VFI*

In the case where either level of government has a zero fiscal gap or is required to raise taxes/reduce program spending in order to satisfy its intertemporal budget constraint (i.e., $\Delta^{F} \geq 0$ and $\Delta^{PT} \geq 0$), no VFI is detected. In this instance, it would not be possible to improve or restore fiscal sustainability to one level of government -- by adjusting intergovernmental transfers -- without making the other level of government fiscally unsustainable or further weakening its fiscal position. In this case, discussing VFI does not seem entirely appropriate given that both levels of government would likely have more fundamental fiscal problems.

When there are negative fiscal gaps (i.e., $\Delta^{F} < 0$ and $\Delta^{PT} < 0$), both levels of government have fiscal room available to reduce taxes or increase program spending.

While the amount of fiscal room is not likely to be the same for both levels of government, it is the case that the initial path of intergovernmental transfers, in conjunction with provincial/territorial own-source revenues, ensures that provincial/territorial governments could -- at a minimum -- meet their projected spending pressures in a fiscally sustainable manner. Provincial/territorial governments could satisfy their intertemporal budget constraint and potentially have fiscal room available for additional budgetary measures.

The VFI indicator presented above in Table 1 takes into consideration the nature of the adjustment required to satisfy the intertemporal budget constraint (i.e., whether Δ^F and Δ^{PT} is negative or positive). If we were to consider an indicator of VFI based solely on the differential between Δ^F and Δ^{PT}, VFI would be detected in all instances except in cases where Δ^F and Δ^{PT} are equal to each other. We believe that our indicator is more meaningful for determining whether or not there is VFI between the federal and provincial/territorial governments because it maintains the link between VFI and fiscal sustainability, accounting for fiscal imbalances within and across levels of government. Under a simple "differential" indicator (e.g., $\Delta^F - \Delta^{PT}$), the link between VFI and fiscal sustainability is severed. For example, the difference between Δ^F and Δ^{PT} would have to equal zero in order for there to be no VFI; the difference between Δ^F and Δ^{PT} could be positive or negative -- indicating VFI -- however the sign could potentially mask important imbalances for a given level of government. Thus, the purely relative nature of a differential indicator essentially detaches VFI from the overall framework of fiscal sustainability.

Our definition of VFI discussed above and presented in Table 1, is also consistent with the concept of vertical imbalance cited in Ruggeri and Howard (2000), which states that VFI exists when "the national government has an excess supply of revenue while state and local governments have an excess supply of needs".[4] In our framework, if either level of government has a zero fiscal gap or has fiscal room available ($\Delta^F \leq 0$ and

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[4] Ruggeri and Howard (2000) cite Wagner (1973).

$\Delta^{PT} \leq 0$) then it could be argued that neither level of government has an excess supply of needs and thus VFI does not exist; each level of government is projected to have sufficient revenues to meet projected spending.

In sum, the concept of VFI developed in this paper continues to extend beyond the conventional definition. In Ruggeri et al. (1993a, 1993b), the conventional concept of VFI was first placed into a dynamic framework. Within this dynamic framework, Ruggeri et al. (1993a) extended the concept by making the qualitative link between the stability of the debt-to-GDP ratio and structural imbalance. This paper then extends the framework further by explicitly incorporating the link between budget balances and fiscal sustainability. The indicator of VFI in our framework accounts for and quantifies fiscal imbalances within and across levels of government.

2 Fiscal Projection Frameworks

This section discusses the fiscal projection framework used in recent VFI studies and then presents the framework that is used to generate long-term fiscal projections which form the basis of our VFI indicator. Fiscal, economic and demographic data and assumptions are also presented.

The previous section discussed approaches to assessing VFI based on extensions to the conventional "mismatching" concept of VFI. Given the dynamic nature of these extended approaches, fiscal projections of future federal and provincial/territorial budgetary items are often required for measurement purposes. Ruggeri and Howard (2000) develop a relatively small structural model that projects federal and consolidated provincial/territorial revenues and expenditures over the period 1999/00 to 2019/20 given various economic, fiscal and demographic assumptions.

In constructing fiscal projections for the purpose of analysing VFI, Ruggeri and Howard (2000) and Ruggeri et al. (1993a, 1993b) stress the structural nature of the projections. They note that in order to analyse the dynamics of existing fiscal structures, it is necessary to exclude future discretionary policy changes and the impacts of cyclical fluctuations however, announced policy changes should be included in the existing fiscal

structure. They also note that these projections "should not be treated as forecasts against which to compare actual outcomes" (Ruggeri and Howard (2000: p.7)). Thus, this "structural" approach lends itself to the long-run nature of the fiscal projections.

In order to compute the fiscal gap estimates based on the Auerbach (1997) framework, it is first necessary to obtain or construct long-term fiscal projections. In their analysis of long-term fiscal imbalance in the United States, Auerbach and Gale (2000) use the most recent long-term budget forecasts produced by the Congressional Budget Office (CBO) which forecast through the year 2070. Since analogous projections do not exist for the federal and consolidated provincial/territorial governments in Canada, it is necessary to construct long-term fiscal projections. This may appear at first glance to be a difficult task however there are existing projection frameworks that can be easily extended to project fiscal aggregates (in a meaningful way) over an extended period of time.

2.1 Fiscal Projections in Ruggeri et al. / Ruggeri and Howard (2000)

The models developed by Ruggeri et al. (1993a, 1993b) and Ruggeri and Howard (2000) generate structural fiscal projections based on two key components: the growth rate of nominal GDP and the elasticity or "growth ratio" of revenue and spending. In Ruggeri et al. (1993a, 1993b), the growth rate of GDP over the projection period is defined as an average annual growth rate. To project nominal GDP, Ruggeri et al. assume a constant rate of inflation π, constant real per capita income growth RPG, and constant population growth POP for the period 1992/93 to 2013/14. These assumptions imply a constant nominal GDP growth rate YG.

$$(1+YG) = (1+\pi)\cdot(1+RPG)\cdot(1+POP) \tag{11}$$

Next, given estimates of income elasticities (i.e., with respect to GDP) for various tax sources E_{T_i}, the growth rate of total revenue TG can then be computed (T denotes total revenue) as

$$TG = YG\,E_T, \quad \text{where } E_T = \sum_{i=1}^{n}\left(E_{T_i}\cdot\frac{T_i}{T}\right). \tag{12}$$

The same approach is applied to government spending however its growth is based on a "projected" elasticity, which the authors refer to as a growth ratio and define as "the built-in growth rate of a given expenditure or revenue ... divided by the growth rate of nominal GDP".

Ruggeri and Howard (2000) adopt essentially the same "growth ratio" approach to generating fiscal projections. There is however a modification to one of the key components in their earlier model. Instead of projecting nominal GDP growth on the basis of the components included in equation (11), growth in employment $\dot{E}$ and labour productivity growth g are used. In addition, year-over-year changes in the growth rates are included in the calculations in place of average annual growth rates.

(13) $$(1+\dot{Y}_t) = (1+\pi_t)\cdot(1+\dot{E}_t)\cdot(1+g_t)$$

The projected growth rates in employment are consistent with an underlying population projection. The growth rate of nominal GDP and its underlying components are then used in conjunction with the growth ratios to project revenue and spending categories over the period 1999/00 to 2019/20.

The "growth ratio" approach to projecting government revenue and spending -- only indirectly and somewhat partially -- incorporates the structural demographic determinants of revenue and program spending. The projected rate of GDP growth incorporates assumptions about population and employment growth and these components enter into most of the revenue and spending categories. In some cases, such as federal OAS payments and provincial health spending, there is an attempt to incorporate, more explicitly, the impact of demographics. However, the remaining spending categories and all of the revenue categories capture only the impact of population growth and do not account for the impacts of changes in the age structure of the population on spending and revenue.

The indirect and partial attempt to incorporate the impact of demographics is potentially serious given that changes to Canada's demographic structure are projected to be substantial. King and Jackson (2000) note that a government must maintain a constant

level of real per capita expenditure on each age group if it wishes to maintain a consistent level of programs and services through time. They also note that the pressure of an ageing population in Canada will be compounded by increased life expectancy, giving rise to a "double-ageing process".[5] Thus, in general, the revenue and expenditure projections generated under the growth ratio approach neglect, to a certain extent, these key structural demographic factors. King and Jackson's (2000) approach to projecting revenue and spending, which explicitly captures these factors, is similar to the approach developed in the generational accounting (GA) literature.

2.2 Fiscal Projections based on the GA Approach

The generational accounting (GA) framework also uses the government's intertemporal budget constraint to assess fiscal sustainability however it defines sustainability in terms of the fiscal burden on current and future generations. Generational accounting, developed in Auerbach et al. (1991) as an alternative to conventional deficit measures, uses a projection framework that can be easily extended to generate long-term fiscal projections for revenue and program spending categories.

Auerbach et al. (1991) construct generational accounts[6] in two steps. The first step involves computing accounts for current age cohorts (i.e., those age cohorts alive in the base year) under the assumption that the current structure of fiscal policy is maintained over their remaining lifetimes. The second step involves computing the accounts for future age cohorts such that the intertemporal budget constraint is satisfied. The approach undertaken in the first step is the most relevant in terms of constructing long-term "structural" fiscal projections although it is necessary to assume that the current structure of fiscal policy is maintained for both current and future age cohorts in the fiscal projection framework. In standard GA calculations for Canada, it is often assumed that average taxes and spending per age group grow in line with inflation and productivity

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[5] Raffelhüschen (1999) uses the term "double-ageing process" to describe demographic trends in EU member states.

[6] A generational account is defined as the present value of taxes net of transfers (to persons) that a representative age cohort can expect to pay over his/her remaining lifetime.

growth.[7] Extrapolating aggregate taxes and spending using this approach simply requires a starting point, age profiles for taxes and spending and population projections by age group. In their study on the public finance implications of population ageing, King and Jackson (2000) use this type of approach to generate long-term structural projections for various categories of federal and provincial/territorial revenue and spending over the period 1999 to 2040.

2.3 The GA Projection Framework

The fiscal projection framework in this paper is based on the first step of the two-step GA approach. The first step of the GA approach also closely follows King and Jackson's (2000) projection methodology.

First, consider a starting point for a particular category of taxes or program spending (e.g., personal income tax revenue or health spending in nominal terms) denoted as X_t. In the base year, the aggregate amount is allocated to 91 single-year age groups indexed by i, ranging from age 0 to 90+ years ($X_{i,t}$ for $i=1$ *to* 91). The tax/spending allocation by age group X_t is usually based on survey data or microsimulation models.[8] Next, it is necessary to obtain population projections by age group ($POP_{i,t}$) for the period in question and a price index P. With this information the aggregate base-year value can be expressed in terms of three components: the average real per capita levels by age group $A_{i,t} \equiv \frac{X_{i,t}}{P_t \cdot POP_{i,t}}$, the number of individuals in each age group $POP_{i,t}$ and the price index P.

$$X_t = \sum_{i=1}^{91} A_{i,t} \cdot POP_{i,t} \cdot P_t \tag{14}$$

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[7] For example, see Oreopoulos and Kotlikoff (1996), Oreopoulos and Vaillancourt (1998) and Matier and Fougère (1999).

[8] GA studies for Canada typically use Statistics Canada's SPSD/M microsimulation database and model to generate age profiles for tax and spending categories. See Bordt et al. (1990) for further details.

Equation (14) can be solved forward and with some algebraic manipulation, the equation describing the future evolution of X can be represented as,

$$X_{t+1} = \left(\sum_{i=1}^{91} A_{i,t+1} \cdot POP_{i,t+1} \Big/ \sum_{i=1}^{91} A_{i,t} \cdot POP_{i,t} \right) \cdot (P_{t+1}/P_t) \cdot X_t . \tag{15}$$

One of the standard assumptions employed in the GA framework is that average real per capita levels by age group grow at the assumed (constant) rate of productivity growth g. As well, it is also assumed that the relative age profile of X (defined as $R_{i,t} \equiv \frac{A_{i,t}}{A_{j,t}}$, where A_j is the numeraire age group) is maintained over the projection period (i.e., $R_{i,t} = R_i$). These assumptions, along with that of a constant rate of inflation π, are embodied in equation (16) describing the evolution of X over the projection period.

$$X_{t+1} = (1+g) \cdot \left(\sum_{i=1}^{91} R_i \cdot POP_{i,t+1} \Big/ \sum_{i=1}^{91} R_i \cdot POP_{i,t} \right) \cdot (1+\pi) \cdot X_t \tag{16}$$

Thus, given the assumptions about productivity growth and inflation, the relative age profile of X in conjunction with the population projections by age group is sufficient to generate a long-term structural projection for X.

2.4 Fiscal Data and Assumptions

The fiscal projection framework developed in this paper conforms to the Public Accounts. Ruggeri and Howard (2000) use FMS (Financial Management System) data which is closely related to the Public Accounts. While FMS data has advantages in terms of ensuring conformity across provinces and levels of governments, Public Accounts data is used instead because it is more familiar and it is available on a more timely basis.

On a Public Accounts basis, for a given level of government, net public debt D is equal to the sum of all previous years' budgetary balances BB and evolves according to equation (17). The primary balance PB in this framework is defined as revenue (i.e., total revenue net of revenue from financial assets) minus program spending. Auerbach's (1997) fiscal

gap measure is defined as Δ in equation (18) below. In order to compute Δ, projections of the primary balance and GDP are required in addition to the base-year level of net public debt and interest rate r.

(17) $$D_t = D_{t-1} - BB_t = (1+r)\cdot D_{t-1} - PB_t$$

(18) $$D_t = \sum_{i=1}^{\infty}(1+r)^{-i}\cdot\left[PB_{t+i} + \Delta\cdot GDP_{t+i}\right]$$

Federal and consolidated provincial/territorial categories of revenue and program spending are essentially the same categories used in King and Jackson (2000), which also projects fiscal aggregates on a Public Accounts basis. Unless otherwise noted (see Table 2 below), future values of the revenue and program spending categories (as well as GDP) are projected to evolve according to equation (16), where growth in a particular category is determined by: productivity growth, population growth, population composition and inflation. For revenue and spending categories evolving according to equation (16), annual productivity growth and inflation rates are assumed constant at 1.5% and 2.0% respectively over the projection period. The nominal interest rate used in equation (18) is also assumed constant at 7% for both levels of government.

Table 2 Federal and Provincial/Territorial Revenue and Program Spending Categories

Federal Revenue Categories	***Provincial/Territorial Revenue Categories***
Personal Income Tax	Personal Income Tax
Corporate Income Tax	Corporate Income Tax
Employment Insurance Premium	Retail Sales Tax
Goods and Services Tax	Other Revenue
Other Revenue	Federal Transfers (*see Federal Program Spending*)
Federal Program Spending Categories	***Provincial/Territorial Spending Categories***
Elderly Benefits	Health
Employment Insurance Benefits	Education
Net Direct Program Spending	Social Services
Fiscal Arrangements: *grows in line with nominal GDP*	Other Program Spending
Alternative Payments for Standing Programs: *grows in line with nominal GDP*	
CHST: *follows the FMM funding commitment to 2005/06, cash payments rising to $21 billion then growing at an annual rate of 3.5%*	

Most of the age profiles of federal and provincial/territorial categories of revenues and program spending were obtained using Statistics Canada's Social Policy Simulator Database and Model (SPSD/M).[9] For some revenue and spending categories that evolve according to equation (16), the relative age profile is assumed to be "flat" across age cohorts (i.e., $R_i = 1$).[10]

Federal major transfers to other levels of government consist of Fiscal Arrangements (FA), Alternative Payments for Standing Programs (APSP) and the CHST. FA and APSP are assumed to grow at the same rate as nominal GDP, following the *Economic Statement and Budget Update 2000*.[11] In the case of the CHST, the timing of federal cash payments and the payments received by the provincial/territorial governments differs slightly over the period 2000/01 to 2005/06, largely due to the booking of CHST supplements at the federal level. Table 3 below presents the assumed payment/receipt paths for both levels of government. The amounts in Table 3 also include: $1.0 billion funding for the Medical Equipment Fund, $500 million under Health Information Technology and $800 million under the Health Care Transition Fund for Primary Care, which were agreed to at the September 2000 First Ministers' Meeting (FMM).

Table 3 Federal Cash Transfers associated with the CHST ($billions)

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Federal	15.8	17.3	18.6	19.3	20.4	21.0
Provincial/ Territorial	16.5	19.0	19.3	20.0	20.6	21.0

[9] The age profile for health spending is taken from CIHI's *National Health Expenditure Trends*, 1975-2000 (Canadian Institute for Health Information). For education, spending is allocated based on data from Statistics Canada's Education Quarterly Review (Catalogue no. 81-003).

[10] Flat relative profiles, across all age groups, are assumed for federal direct program spending and provincial/territorial other program spending as well as federal and provincial/territorial other revenue.

[11] The bulk of Fiscal Arrangements consists of Equalization and Territorial Formula Financing payments. Alternative Payments for Standing Programs (APSP) represent recoveries of federal tax-point abatements under contracting-out arrangements.

For the consolidated provincial/territorial government, the projected cash amounts are taken from the September 2000 news release following the First Ministers' Meeting. At the federal level, the initial path of CHST cash is taken from *The Budget Plan 2000* and it has been adjusted to reflect the FMM funding commitments. Beyond 2005/06, CHST cash is assumed to increase at the rate of 3.5% per year from its 2005/06 level of $21.0 billion. The assumed annual increase of 3.5% represents the average annual rate of increase in CHST cash over the period 2001/02 to 2005/06 (from $18.3 billion to $21.0 billion).[12]

2.5 Economic and Demographic Data and Assumptions

In order to project nominal GDP such that it is consistent with the fiscal projection framework and its underlying assumptions, equation (16) is used. As a proxy for the age profile of nominal GDP, the age profile of market income (by age group) from SPSD/M is used. Projecting nominal GDP in this manner is similar to the approach used in Ruggeri et al. (1993a) however it is adjusted to reflect year-over-year changes in population growth and population composition. As a result, real per capita income by age group is projected to grow at the rate of productivity growth.

Demographic projections[13] are based on Statistics Canada's "medium" projection scenario. Underlying this projection scenario are four key component assumptions. First, fertility, defined in terms of births per woman of childbearing age, is assumed to be 1.48. Next, life expectancy at birth for women (men) is assumed to rise to 84.0 (80.0) in 2026. Immigration is assumed to be 225,000 persons per year. Finally, in terms of inter-provincial migration, the medium projection scenario assumes that the central and western provinces are the largest net recipients of migrants. Demographic projections by single year age groups are extended beyond 2026 by assuming that the above component assumptions remain constant at their 2026 levels.

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[12] Table 3 shows a cash payment in 2001/02 of $19.0 billion. This includes $18.3 billion under the CHST plus $0.7 billion from additional federal health funding agreed to at the 2000 FMM.

[13] See *Population Projections for Canada, Provinces and Territories, 2000-2026* (Catalogue no. 91-520).

3 Results

3.1 Fiscal Projections

This section first presents the underlying fiscal projections upon which our VFI indicator is based. Starting points for the revenue and program spending categories are based on the 2000 federal and provincial/territorial budgets and budget updates. Future values of these categories were extrapolated from their initial values according to the assumptions described in the previous section. The projection horizon is limited by the demographic data, which extends from 2000 to 2100. Fiscal projections presented below cover the period 2000/01 to 2040/41.[14]

Before presenting the underlying fiscal projections, it is important to first highlight some important caveats. There are two main criticisms levelled against projecting fiscal variables in the manner described above. First, critics note that these types of projections fail to take into account behavioural responses or feedback effects. This is indeed the case and thus the projections should be treated as approximations that "mimic the long-run structural behaviour of government revenue and expenditure" (King and Jackson (2000: p.12)). Ruggeri and Howard (2000: p.7) also note that projections of this type should not be treated as forecasts rather, "they represent projections based on certain assumptions about trends in selected demographic and economic variables and the associated trends in revenues and expenditures". Second, it should be borne in mind that there is considerable uncertainty surrounding any long-term fiscal projection. This fact in itself, however, does not diminish the usefulness of long-term projection exercises. Oreopoulos and Vaillancourt (1998: p.10) note that "one cannot use the argument that, because the future is uncertain, we should only use past policies to predict the future … we have no choice but to postulate about the future". As suggested in their work, our

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[14] In the charts depicting the fiscal projections, the year 2000 refers to fiscal year 2000/01. The entire projection period out to 2100 is not presented in the charts. Truncating the period helps to facilitate comparison with other studies such as King and Jackson (2000) and Ruggeri and Howard (2000). Omitting the period beyond 2040 from the charts is not particularly crucial since most of the fiscal impacts associated with the demographic transition have transpired by this time. Projections extending to 2100 are available upon request.

fiscal projections should be regarded as "what if" scenarios that can be easily modified if the fiscal projections need to be changed.

Charts 1a to 1d below present projections of key revenue and expenditure categories for the federal and consolidated provincial/territorial governments over the period 2000/01 to 2040/41.

Chart 1a Federal Revenue (% of GDP)

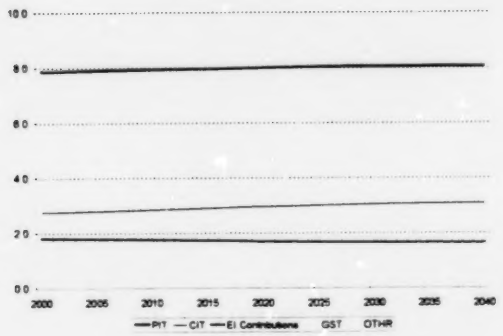


Chart 1b Federal Program Spending (% of GDP)

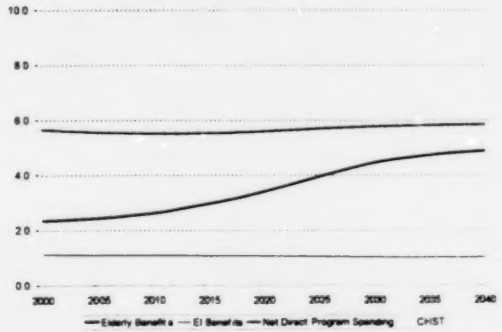


Chart 1c Provincial/Territorial Revenue (% of GDP)

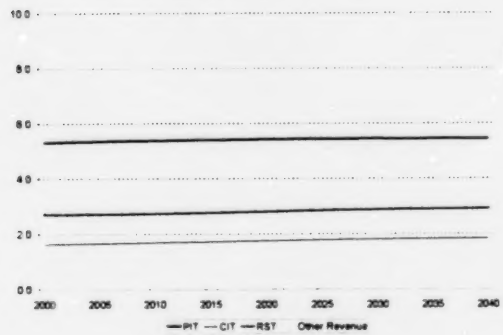
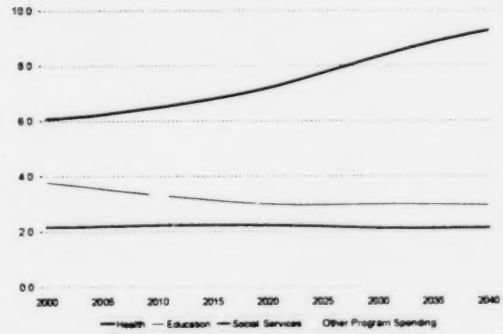


Chart 1d Provincial/Territorial Program Spending (% of GDP)



It is important to recall that most of the above projections are based on the assumption that real per capita/per age group values in each category grow at a rate of 1.5% per year from their initial levels. Thus, for a given relative age profile, the key components driving the projected aggregate category are population growth and population composition. The extent to which a fiscal category as a share of GDP rises or falls depends on the shape of its age profile relative to the age profile of GDP/income and the growth in the size of age groups falling outside of the age profile of GDP/income. For

example, spending that is heavily skewed toward the elderly segment of the population, such as health spending, will rise rapidly as a share of GDP as the size of the elderly age group grows. As the size of the elderly age group stabilises, health spending as a share of GDP will tend to flatten somewhat. Categories of revenue and spending that resemble the age profile of GDP/income will tend to remain relatively stable over time as a share of GDP.

In terms of revenue, both levels of government are projected to face small increases (as a share of GDP) in most of their revenue categories. Beyond 2040, these categories as a share of GDP remain fairly stable. These projections are generally in line with those generated in King and Jackson (2000). They note that in terms of demographic impacts (all other things equal) there is "relatively little consequence for tax revenues".

By contrast, projections of the program spending categories for both levels of government show dramatic movements, which is not surprising given that spending categories are more highly skewed across age groups. At the federal level, spending on elderly benefits, which includes Old Age Security (OAS) pensions, the Guaranteed Income Supplement (GIS) and the spouse's allowance, is projected to rise significantly, from 2.4% to 4.9% of GDP by 2040/41. At the consolidated provincial/territorial level, health spending is projected to rise substantially from 6.1% to 9.3% by 2040/41. There is however some offset attributable to education spending which is projected to fall from 3.8% to 2.9% of GDP by 2040/41. The spending projections, in most cases, are in line with the projections generated in King and Jackson (2000). There are however some differences that emerge with respect to spending on health, OAS and the CHST.[15]

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[15] The benchmark health spending projection generated in the benchmark falls between King and Jackson's (2000) health spending scenarios A and B. For OAS, King and Jackson assume that real per capita/per age group spending does not grow, resulting in spending as a share of GDP in 2040 of just over 3.0%. Our assumption for OAS that real per capita/per age group spending grows with productivity, results in about a 2-percentage point gap between the two projections in 2040. In King and Jackson (2000), CHST entitlements are assumed to grow in line with nominal GDP or with provincial health spending.

Given the individual revenue and program spending projections, it is straightforward to project primary balances and net public debt for both levels of government.[16] Charts 2a and 2b below present the projected primary balance and net public debt-to-GDP ratios for the federal and provincial/territorial governments. The projected primary balances follow approximately the same pattern out to 2040/41. Both levels of government are projected to face rapidly declining debt-to-GDP ratios over the entire projection period.[17] The provincial/territorial debt-to-GDP ratio declines at a slightly slower pace than the federal debt ratio however its net debt is eliminated before the federal government.

Chart 2a Primary Balance (% of GDP)

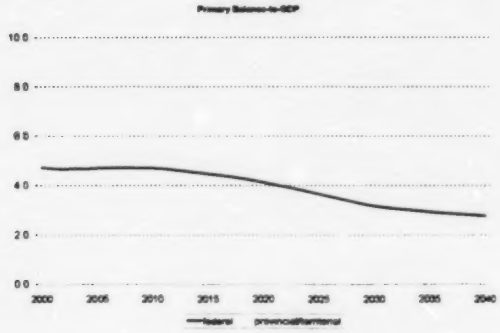
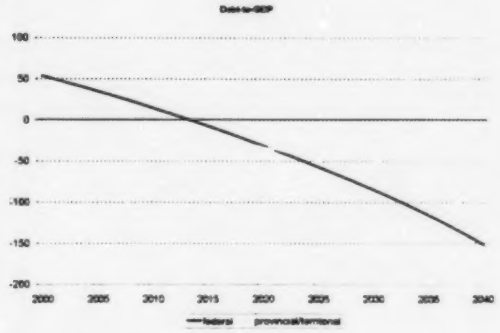


Chart 2b Net Public Debt (% of GDP)



3.2 Results: VFI Indicator

This section presents the VFI indicator based on Auerbach's (1997) measure of fiscal imbalance (i.e., the "fiscal gap" or "fiscal room" available beyond that implied by initial projected paths of revenue and program spending). Recall that VFI is detected when the federal government has fiscal room available to reduce taxes or increase program

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[16] The net public debt extrapolation using equation (1) requires a starting point, an interest rate and the projected primary balance.

[17] In terms of the federal debt-to-GDP projection, the results are quite similar to King and Jackson's (2000) "tight fiscal regime" benchmark scenario (i.e., all surpluses go to debt reduction). King and Jackson also consider other fiscal regimes that assume various rules for dividing up future fiscal dividends. While these regimes are crucial to their analysis, they are not required for this paper given its "structural" focus. Ruggeri and Howard (2000: p.8) note that "any options for the use of the surplus involves a policy choice, a step which is conceptually inconsistent with the no policy change foundations of vertical fiscal imbalances".

spending (i.e., a negative fiscal gap $\Delta^F < 0$) while the provinces and territories must raise taxes or reduce program spending to satisfy their intertemporal budget constraint (i.e., a positive fiscal gap $\Delta^{PT} > 0$) and vice versa. If both levels of government are fiscally sustainable or have fiscal room available ($\Delta^F \leq 0$ and $\Delta^{PT} \leq 0$) beyond that implied by their initial projected primary balances, no VFI is detected. Estimates of the fiscal gap for both levels of government are presented in Table 4 below. The "benchmark" estimates are based on fiscal projections of the primary balances presented in Chart 2a. Several other sets of estimates are also presented to gauge the sensitivity of the results to alternative economic and fiscal assumptions.

Table 4 VFI Indicators

Estimates	Description	Δ^F	Δ^{PT}	VFI Indicator
benchmark	- most revenue and spending categories grow (on a real per capita/per age group basis) with productivity growth of 1.5%	-2.11	-1.21	***No VFI***
higher interest rate	- benchmark assumptions with 200bp increase in interest rate from 7% to 9%	-1.50	-1.12	***No VFI***
lower interest rate	- benchmark assumptions with 200bp decrease in interest rate from 7% to 5%	-2.48	-1.05	***No VFI***
higher productivity growth	- benchmark assumptions with 100bp increase in productivity growth from 1.5% to 2.5%	-2.77	-0.73	***No VFI***
lower productivity growth	- benchmark assumptions with 100bp decrease in productivity growth from 1.5% to 0.5%	-1.36	-1.63	***No VFI***
alternative health spending I	- benchmark assumptions with 25bp increase in assumed health spending growth (real per capita/per age group) from 1.5% to 1.75%	-2.11	-0.51	***No VFI***
alternative health spending II	- benchmark assumptions with 50bp increase in assumed health spending growth (real per capita/per age group) from 1.5% to 2%	-2.11	0.30	***+VFI***
announced revenue measures	- federal measures from *The Budget Plan 2000* and the *Economic Statement and Budget Update 2000*, provincial measures from various budgets	-0.33	-0.30	***No VFI***

Benchmark Estimates

Recall that under the benchmark, the underlying fiscal projections are based on the assumption that real per capita/per age group values in each own-source revenue and

program spending category grow at a rate of 1.5% per year from their initial levels. In terms of federal transfers, CHST cash payments grow at 3.5% per year beyond 2005/06 and transfers under Fiscal Arrangements (i.e., largely Equalization and Territorial Formula Financing) grow in line with GDP.

The results indicate that, at the federal level, there is a fiscal gap of -2.11% of GDP, which suggests that taxes (program spending) could be reduced (increased) permanently by this amount each and every year beyond their initial projected levels while maintaining fiscal sustainability. At the provincial/territorial level, a fiscal gap of -1.21% of GDP is observed which also indicates that there is fiscal room available to implement revenue or spending measures and maintain fiscal sustainability. Since both levels of government have fiscal room available (i.e., negative fiscal gaps) beyond the initial fiscal projections, there is no indication of VFI. Thus, the initial projected paths of federal intergovernmental transfers and own-source revenues are sufficient in this framework because they ensure that provincial/territorial governments have the fiscal capacity to meet their projected spending in a fiscally sustainable manner. If it were the case that the federal government had additional fiscal room but the provinces/territories did not, one could argue that the projected path of transfers, in conjunction with own-source revenues, would not be sufficient to meet projected provincial/territorial spending.

Higher Interest Rate

In this set of estimates, the nominal interest rate is assumed to be 9%, exceeding the benchmark interest rate by 200 basis points. This change in the interest rate is the only assumption that differs from the benchmark. The interest rate is used to calculate the present value of the projected primary balance and GDP, which enter the numerator and denominator (respectively) of the fiscal gap measure. Thus, the resulting change in the fiscal gap measure is ambiguous when the interest rate is changed. At the federal and provincial/territorial levels, increasing the interest rate reduces both the present values of the projected primary balances and GDP. Increasing the interest rate places less weight on observations in the far distant future and, since all series are growing over time, the larger future values will have a smaller influence in the present-value measure. For both

levels of government, the change in the present value of the primary balance (relative to the benchmark) dominates the change in the present value of GDP, resulting in smaller (negative) fiscal gaps. Fiscal gaps of –1.50% and –1.12% of GDP are observed (respectively) at the federal and provincial/territorial levels. While the amount of fiscal room is smaller under the higher interest rate, the VFI indicator is unchanged from the benchmark.

Lower Interest Rate

The interest rate is assumed to be 5% in this set of estimates, 200 basis points below the benchmark interest rate. Again, the change in the interest rate is the only assumption that differs from the benchmark. At the federal and provincial/territorial levels, reducing the interest rate increases both the present values of the projected primary balances and GDP. Reducing the interest rate places relatively more weight on observations in the far distant future, which results in the (larger) future values having a greater influence on the present-value measure. Fiscal gaps of –2.48% and –1.05% of GDP are observed (respectively) at the federal and provincial/territorial levels. At the federal level, the increase in the present value of the primary balance (which acts to widen the negative fiscal gap) again dominates the increase in the present value of GDP, resulting in a larger fiscal gap (in absolute value) compared to the benchmark. However, at the provincial/territorial level the opposite occurs, resulting in a smaller fiscal gap compared to the benchmark.[18] Nonetheless, under the assumed lower interest rate, the VFI indicator is unchanged from the benchmark.

Higher Productivity Growth

Productivity growth is assumed constant at 1.5% per year in the benchmark. In this set of estimates, productivity growth is set at 2.5% per year, 100 basis points above the

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[18] The increase in the present value of the provincial/territorial primary balance (due to the lower interest rate) is not as dominant (relative to the increase in the present value of GDP) as is the case at the federal level. This result occurs because the projected provincial/territorial primary balance does not grow as rapidly as the federal primary balance and thus future values of the provincial/territorial primary balance are considerably smaller.

benchmark level -- no other assumptions are changed. Most revenue and spending categories, on a real per capita/per age group basis, grow in line with productivity growth, and therefore as a percentage of GDP, the projected categories in this case are identical to the projections underlying the benchmark. One key category that is not identical (expressed as a percentage of GDP) is the CHST, which is assumed to grow at a constant rate of 3.5% per year after 2005/06. Under the higher assumed productivity growth rate, federal primary balances grow at a faster rate than provincial/territorial primary balances relative to the benchmark. This results in a larger fiscal gap (i.e., more fiscal room) at the federal level, relative to the benchmark, and less fiscal room at the provincial/territorial level. Fiscal gaps of –2.77% and –0.73% of GDP are observed (respectively) at the federal and provincial/territorial levels and the VFI indicator does not change from the benchmark.

Lower Productivity Growth

In this set of estimates, productivity growth is set at 0.5% per year, 100 basis points below the benchmark level. Under the lower assumed productivity growth rate, federal primary balances grow at a slower rate than provincial/territorial primary balances relative to the benchmark. This results in a smaller fiscal gap (i.e., less fiscal room) at the federal level, relative to the benchmark, and more fiscal room at the provincial/territorial level. Fiscal gaps of –1.36% and –1.63% of GDP are observed (respectively) at the federal and provincial/territorial levels. Again, the VFI indicator does not change from the benchmark.

Alternative Health Spending I

Health spending at the provincial/territorial level, on a real per capita/per age group basis, is assumed to growth at 1.5% per year in the benchmark. Under alternative health spending I, this growth rate is increased by 25 basis points to 1.75% per year -- no other assumptions are changed. While this increase might appear trivial at first glance, it is important to note that this change results in an increase in health spending (as a percentage of GDP) from 6.1% in 2000/01 to 10.2% in 2040/41, which is about 1-percentage point of GDP higher than the benchmark. Increased health spending does not

impact the federal government and as a result, its fiscal gap measure is unchanged from the benchmark. At the provincial/territorial level however, the (negative) gap is reduced to –0.51% from –1.21% of GDP under the benchmark. There is fiscal room remaining at the provincial/territorial level in this scenario and as a result, the VFI indicator remains unchanged from the benchmark.

Alternative Health Spending II

Under alternative health spending II, the real per capita/per age group growth rate in health spending is increased by 50 basis points above the benchmark to 2.0% per year. This change results in an increase in health spending (as a percentage of GDP) from 6.1% in 2000/01 to 11.3% in 2040/41 -- 2-percentage points of GDP higher than the benchmark. At the provincial/territorial level, the fiscal gap is in fact positive (0.30% of GDP), indicating that increased revenue or reduced program spending is required to ensure fiscal sustainability. The federal fiscal gap is unchanged from its benchmark value. In this scenario, the VFI indicator shows a (positive) vertical fiscal imbalance in favour of the federal government. Federal intergovernmental transfers in this case could be increased above the projected benchmark levels, eliminating the provincial/territorial fiscal gap while ensuring fiscal sustainability/balance at the federal level.

Announced Revenue Measures

Under the benchmark, federal and provincial own-source revenue categories grow from their initial levels in line with inflation, population and productivity growth and population compositional change. As a result, the benchmark extrapolation does not include any announced future tax policy measures for either level of government. Following Ruggeri and Howard (2000), this set of estimates incorporates the announced future changes to various federal and provincial/territorial tax categories. For the federal government, announced future tax measures for the period 2000/01 to 2005/06 were taken from *The Budget Plan 2000* and the *Economic Statement and Budget Update 2000*. For the consolidated provincial/territorial governments, announced future tax measures out to 2004/05 were taken from various provincial and territorial budgets. Beyond the 2005/06 and 2004/05 endpoints, federal and provincial/territorial revenues evolve

according to the fiscal projection framework described above and the benchmark assumptions. It is also important to note that while projected tax categories are adjusted for announced future measures, the spending categories are not adjusted from their projected benchmark values.

Incorporating the announced future tax measures reduces the negative fiscal gaps observed under the benchmark for both levels of government. At the federal level, the fiscal gap is -0.33% of GDP and, at the provincial/territorial level, the gap is -0.30% of GDP. In both cases, taxes (program spending) could be further reduced (increased) permanently by this amount while maintaining fiscal sustainability.

In general, the results presented above suggest that there does not appear to be a vertical fiscal imbalance between the federal and provincial/territorial governments in Canada. Under the benchmark estimates, both the federal and provincial/territorial levels of government have fiscal room available beyond that implied by their initial revenue and program spending projections, indicating that there is no vertical fiscal imbalance. This finding is robust to estimates computed under other assumptions and scenarios, with the exception of a scenario that considers increased provincial/territorial health spending which is substantially higher than the benchmark projection.

Summary and Conclusions

This paper briefly surveys recent studies on VFI in Canada. These studies subscribe to a definition of VFI that is based on the mismatch in structural budget balances between the federal and provincial/territorial levels of government. Based on this definition and measured in terms of projected budget balances, these studies find a large and growing VFI.

By constructing a measure of VFI that is based strictly on the relative size of budget balances in a given year, there is a potential to fall into the trap of "fiscal illusion". Recent studies, however, do not directly link VFI with the notion of fiscal sustainability. Using a measure of fiscal sustainability developed in Auerbach (1997), this paper

constructs an indicator of VFI based on the amount fiscal room available (i.e., subject to the intertemporal budget constraint) to each level of government.

Our approach, in some sense, extends the conventional "mismatching" definition of VFI into a dynamic framework that explicitly incorporates the link between budget balances and fiscal sustainability. In this framework, VFI is said to exist if one level of government has fiscal room available to reduce taxes or increase program spending -- and satisfy its intertemporal constraint -- while the other level of government must increase taxes or reduce spending in order to achieve fiscal sustainability.

In order to calculate estimates of fiscal room, long-term projections of revenue and program spending categories are required. Using a fiscal projection approach employed in generational accounting (GA) studies and in King and Jackson (2000), this paper calculates estimates of federal and provincial/territorial fiscal room under various assumptions and scenarios.

Based on long-term projections of revenue and program spending generated under various assumptions and scenarios, and given this paper's definition of VFI, there does not appear to be a vertical fiscal imbalance between the federal and provincial/territorial governments in Canada.

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